

Response to Office Action  
September 2, 2003  
Ser. No.: 09/756,597  
Attorney Ref. No.: 130.01

## **Remarks**

### **Introduction**

The examiner has rejected all claims of the present patent, based on the conclusion that it would have been obvious to combine the terpene-based lighter fluid of Wilkins (5,252,107) with the gelling process of Wesley (5,773,706) to create the applicant's composition.

However, the present invention is not obvious, for four reasons: (i) contrary to the examiner's assumption, Wesley's gelling method cannot be readily adapted to gel the lighter fluid of Wilkins, (ii) Wilkins uses alcohols with at least three carbons, while the present invention relies on non-homologous ethanol or methanol, (iii) Wilkins is a single phase clear fluid, and nothing in Wilkins or Wesley suggests instead creating a opaque emulsion, like the present invention, (iv) there are strong objective indicia of nonobviousness, including the applicant's patent license to industry-leader Duraflame. *See In re Sernaker*, 217 U.S.P.Q. 1, 7 (Fed. Cir. 1983).

In making these arguments for patentability, the applicant does not just rely on conjecture or lawyer argument. Instead, the applicant now has *evidence* of nonobviousness, namely a new Rule 1.132 declaration from orange oil expert Ross Gustafson. This declaration explains the important differences between the claimed invention and the prior art, as explained below.

### **1.) There Is No Showing That Wesley's Gelling Method Could Be Used to Create the Composition of the Present Invention**

The present rejection is based on the assumption that the Wesley gelling method could be readily adapted to gel the Wilkins lighter fluid, thereby creating the present

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**A.) Wesley Relies on a Rheological Additive for Gelling, Unlike the Present Invention**

In the present invention, gelling is accomplished solely by a polymeric gel. Indeed, the applicant has added new claims that expressly exclude adding other thickeners. *See* new claims 23 - 25.

In contrast, Wesley relies on a rheological additive for gelling. *See* Wesley, Col. 3: 19 - 27; Declaration of Ross Gustafson ("Gust. Decl.") ¶ 4. This is generally an inorganic compound such as alumina or an amphoteric oxide, and it is this agent which is primarily responsible for the gelling, not the polymeric gelling agent. *Id.* Thus Wesley teaches a different gelling method than the present invention. *Id.*

Indeed, if Wesley's gelling agent were used with the present invention, the composition could not be used as a lighter fluid because the gel would be too thick to allow easy application through a squeeze bottle. *Id.* By only using the polymeric agent, the solution stays much more flowable, more economical, and much easier to handle in production and packaging because it remains flowable. *Id.*

**B.) Wesley's Method is Designed to Gel Polar Solvents, Not d-Limonene**

In Wesley, the solutions being gelled are typically alcohols with other polar solvents. *See* Gust. Decl. ¶ 5.

In the present application, on the other hand, d-limonene is gelled, and this substance is not polar, which is why it will not mix with water on its own. *Id.* Gelling a polar solution is not the same as gelling of a nonpolar compound. *Id.* The composition of the present application does have polar solutions too, but the addition of a nonpolar solvent makes the process entirely different. *Id.* The art of gelling such substances is a

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substances and then causing this solution to gel as in the present application is simply not mentioned or suggested in the Wesley patent. *Id.*

**C.) Wesley's Method is Not Designed to Gel Molecules as Large as d-limonene**

Wesley is directed to gelling fuels which are alkanes, alkenes, alcohols of from 3-6 carbon atoms, aromatic hydrocarbons and mixtures thereof. *See* Wesley Examples 1 - 39; Gust Decl. ¶ 6. Orange oil is generally not considered a fuel, but if it was, it falls well outside the upper size limit of the fuels used in the Wesley patent. *Id.* d-Limonene is a 10-carbon unit which is not aromatic. *Id.* Nowhere in the Wesley patent is a molecule of this size used as an example. *Id.* As molecular sizing increases, typically they will become more difficult to gel. *Id.* This difficulty arises because the polarity of the substances decreases as size increases. *Id.* The polymeric gelling agent itself will not dissolve in orange oil or d-limonene, it would simply fall out of solution and have no effect. *Id.*

**2.) The Present Invention Uses Ethanol and Methanol, and These Alcohols Are Not Homologous with Wilkins' Alcohols of 3 -6 Carbon Atoms.**

The examiner has acknowledged that Wilkins only discloses alcohols with at least three carbon atoms, while the present invention is limited to fluids using methanol or ethanol. However, the examiner has concluded that "this difference is not deemed to be unobvious because Wilkins teaches homologues of the claimed alcohols." *Office Action*, page 3. In other words, the examiner has found that Wilkins' alcohols with 3 - 6 carbon atoms are homologues of the methanol and ethanol used in the present invention.

However, these molecules are not homologues, as the Gustafson Declaration establishes. *See* Gustafson Decl. ¶ 7. As Gustafson describes, methanol and ethanol

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Third, ethanol and methanol are much smaller molecules and therefore they create a more localized polarity within the molecule which allows for stronger hydrogen bonds to form. *Id.* These bonds will allow the alcohols to form a stronger attachment to the outer portion of the emulsion, where they can be ignited. *Id.*

Although the applicant has previously argued that methanol and ethanol were not homologous with Wilkins, the applicant now presents supporting *evidence* to the contrary, and thus the examiner must come forward with countervailing evidence to support any further rejections on this basis.

### **3.) Wilkins is a Single Phase Clear Stable Solution**

Unlike the present invention, Wilkins is a clear, single phase solution. *See* Wilkins Col. 4: 19 - 20, Col. 5: 4 -5, 44 - 45, 53- 54, 60 -61, 67 - 68. In contrast, the present invention is an opaque emulsion, and is definitely not a single phase. *Gust. Decl.* ¶ 8. Therefore, the burning characteristics of the present invention would be significantly different than the burning characteristics of Wilkins. *Id.* For instance, in the Wilkins patent, by having a single clear, stable solution, it is conceivable that the alcohol would burn out of the solution without affecting the orange oil. *Id.* Because it is a single phase, the implication is that the Wilkins composition is a true solution, where the constituents are dispersed equally throughout the solution. *Id.* Because the alcohol is not concentrated, it can burn quickly and not affect any other constituents. *Id.* An opaque emulsion like the present composition, on the other hand, is made of micelles which are suspended in water. *Id.* In this particular case, the emulsion will be orange oil on the non-polar inside of the micelle and the alcohol distributed on the polar out side. *Id.* There will be a greater single point concentration in the solution where the micelles exist of both the orange oil and the alcohol. *Id.* When ignition is achieved, a cell of the alcohol will ignite on the micelle, which will lead to ignition of the orange oil. *Id.*

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The examiner has stated that upon gelling using Wesley's method, the Wilkins solution would necessarily develop an emulsion-type appearance. *See* Office Action at 4. In other words, the examiner has denied the existence of homogeneous gels. However, no support is provided for this assertion, and to the extent this conclusion is based on the examiner's personal knowledge, an affidavit is requested.

#### **4.) There Are Strong Objective Indicia of Nonobviousness**

The applicant had previously submitted objective evidence of nonobviousness, including evidence that the applicant's invention had been licensed to Duraflame, and evidence that applicant's invention has enjoyed strong commercial success, including nationwide distribution in major retail stores such as Safeway and Sears.

In response, the examiner has discounted this evidence for four reasons: (i) licensing is not evidence of commercial success, (ii) the sales may have resulted from Duraflame's marketing efforts, not the value of the product, (iii) market share information is needed to establish commercial success, and (iv) the commercial product is not commensurate with the scope of the claims, since the product's label touts orange oil as an ingredient. *See* Office Action at 4 -5.

As explained below, each of these grounds for rejection is erroneous.

First, whether or not it is also evidence of commercial success, licensing is *by itself* an objective indicator of nonobviousness. *See Patents and the Federal Circuit*, Robert Harmon, 6th ed., § 4.6(c), p. 193 ("licenses under the patent may be persuasive evidence of industry respect for the claimed invention, *and thus persuasive evidence of nonobviousness*"); *In re Serraker*, 217 U.S.P.Q. 1, 7 (Fed. Cir. 1983) (emphasis added).

( )

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The examiner has acknowledged that "Duraflame is one of the market leaders in hearth and barbecue accessories." Office action at pages 4 -5. Yet the examiner has not explained why a market leader like Duraflame would license an "obvious" invention. The mere fact that a sophisticated, leading edge company like Duraflame would pay significant amounts of money for the rights to use this invention is strong evidence of its nonobviousness.

Second, the examiner speculates that the product's commercial success may have resulted from Duraflame's advertising efforts. But as explained in the previously-submitted declaration of Declaration of Prodromos Pericles Stephanos ("Stephanos Declaration"), the product "has not been the subject of significant advertising, other than some coupons." Stephanos Decl. ¶ 25. A nonexistent advertising campaign cannot cause the sale of more than 250,000 units.

Third, the examiner states that raw sales figures alone cannot establish commercial success, but instead the following information is needed: (i) market share, (ii) time period of sales, and (iii) "what sales would normally be expected in the market." As to the first item, market share information is simply not available, to applicant's knowledge. Lighter fluid is a niche market, and sales information is closely guarded. The PTO cannot require applicants to perform the impossible task of providing information that is not available. As to the second item, the applicant states that approximately 250,000 units were sold for the calendar year 2002. As to the third item -- "what sales would normally expected in the market" -- applicant states that this requirement makes no sense, and is not supported by any legal precedent. Applicant does not know what is meant by "normal" sales -- does this refer to sales of new and patentable compositions? Or does it refer to sales of existing compositions offered under new names? In one sense, a new lighter fluid would "normally" receive **zero** sales unless it offered some advantage over existing products. That the applicant's

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Finally, the examiner states that the commercial product is not the same as the claimed product, because the product's package touts its use of orange oil, but the claims are not directed to orange oil. *See* Office Action at 5.

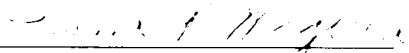
But this assertion -- that the claims are not directed to orange oil -- is just wrong. Claims 2, 11, 20, and 24 are specifically limited to products containing orange oil. Thus, the product being sold is nothing but an embodiment of the claimed invention, and therefore the required "nexus" between the claims and the commercially successful product has been established.

#### *Conclusion*

The applicant appreciates the examiner's effort in giving the present application a thorough review. But with the new evidence from orange oil expert Ross Gustafson, there can be no doubt that the present invention is patentable. Therefore, the applicant respectfully requests that the claims be allowed.

Date: September 2, 2003

By:

  
Daniel P. Maguire, Reg. 41,506  
Tel: (530) 750-3661



UNITED STATES PATENT AND TRADEMARK OFFICE

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SEP 11 2003  
TC 1700

|   |   |                           |
|---|---|---------------------------|
| In re Application of Prodromos Pericles Stephanos | ) |                           |
| Application No. 09/756,597                        | ) | Group Art Unit: 1714      |
| Filed: January 5, 2001                            | ) | Examiner: Cephia Toomer   |
| For: Lighter Fluid Composition                    | ) | Attorney Ref. No.: 130.01 |

Declaration of Ross Gustafson

I, Ross Gustafson, declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true.

Background

1. Attached as Exhibit A to this declaration is a current copy of my resume. As a result of the education and experience described in my resume, I believe that I am qualified to offer this declaration.
2. As indicated in my attached resume, I have extensive experience with citrus oils, including orange oil. For the past six years, I have been Technical Director for the Florida Chemical Company. In that capacity, I have worked with citrus oils in many ways, including assisting customers in the proper use and formulation of citrus by-products, including d-limonene and citrus peel oils.

The Current Patent Application

3. I have reviewed the above-referenced patent application (the "Stephanos application"), as well as the office actions that have been issued, and the responses to those office actions. Based on my review and on discussions with the applicant and his counsel, I understand that the claims of the present invention have been rejected as obvious, based on two references: the Wilkins patent (U.S. patent no. 5,252,107), and the Wesley patent (U.S. patent no. 5,773,706). I understand that the examiner has held that it would have been obvious to combine the Wilkins and Wesley patents to create the gelled limonene-based lighter fluid claimed in the present invention. However, for the



4. First, in the Wesley patent, the thickening of the solution is not accomplished solely by polymeric gel, unlike the present application. See Wesley, Col. 3: 19 - 27. Instead, Wesley requires an auxiliary rheological additive for gelling. *Id.* This is generally an inorganic compound such as alumina or an amphoteric oxide, and it is this agent which is primarily responsible for the gelling, not the polymeric gelling agent. Of course, in the Stephanos application, there is no auxiliary rheological additive, and thus Wesley teaches a different gelling method than the present invention. Indeed, it is my opinion that if Wesley's gelling agent were used with the present invention, the composition could not be used as a lighter fluid because the gel would be too thick to allow easy application through a squeeze bottle. By only using the polymeric agent, the solution stays much more flowable, more economical, and much easier to handle in production and packaging because it remains flowable.

5. Second, in the Wesley patent, the solutions being gelled are typically alcohol solutions with other polar solvents. Orange oil and its main constituent, d-limonene, are not polar, which is why they will not mix with water on their own. Gelling of a polar solution is not the same as gelling of a nonpolar compound. The composition of the Stephanos application does have polar solutions too, but the addition of a nonpolar solvent makes the process entirely different. The art of gelling such substances is a balancing act between the polar and non-polar materials, as they are in general incompatible with each other. Creating the emulsion between the two incompatible substances and then causing this solution to gel as in the Stephanos application is simply not mentioned or suggested in the Wesley patent.

6. Third, the Wesley patent is directed to gelling fuels which are alkanes, alkenes, alcohols of from 3-6 carbon atoms, aromatic hydrocarbons and mixtures thereof. See Examples 1 - 39. Orange oil is generally not considered a fuel, but if it was, it falls well outside the upper size limit of the fuels used in the Wesley patent. d-Limonene is a 10-carbon unit which is not aromatic. Nowhere in the Wesley patent is a molecule of this size used as an example. As molecular sizing increases, typically they will become more difficult to gel. This difficulty arises because the polarity of the substances decreases as size increases. The polymeric gelling agent itself will not dissolve in orange oil or d-limonene; it would simply fall out of solution and have no effect.

7. Fourth, in the Wilkins patent, butyl alcohol is specified as the preferred embodiment, and a range of alcohols in the 3-6 carbon chain length are also presented as appropriate substitutes. Col. 3:41 -46. This is significantly different than using ethanol or methanol, as in the Stephanos application, since these two alcohols are much more volatile and flammable, and burn cleaner. I understand that the examiner has held that ethanol and methanol are homologs to alcohols with a 3-6 carbon chain length. However, I respectfully disagree, because in addition to being more volatile and flammable, ethanol and methanol are much smaller molecules and therefore they create a more localized polarity within the molecule which allows for stronger hydrogen bonds to form. These bonds will allow the alcohols to form a stronger attachment to the outer portion of the emulsion, where they can be ignited.

8. Fifth, the Wilkins patent emphasizes that the solution is a clear stable solution, which intimates that it is a single phase mixture. See Col.4: 19 - 20, Col. 5: 4 -5, 44 - 45, 53- 54, 60 -61, 67 - 68. In contrast, the invention of the Stephanos application is an opaque emulsion, and is definitely not a single phase. Therefore, the burning characteristics of the Stephanos invention would be significantly different than the burning characteristics of Wilkins. For instance, in the Wilkins patent, by having a single clear, stable solution, it is conceivable that the alcohol would burn out of the solution without affecting the orange oil. Because it is a single phase, the implication is that the Wilkins composition is a true solution, where the constituents are dispersed equally throughout the solution. Because the alcohol is not concentrated, it can burn quickly and not affect any other constituents. An opaque emulsion like the Stephanos composition, on the other hand, is made of micelles which are suspended in water. In this particular case, the emulsion will be orange oil on the non-polar inside of the micelle and the alcohol distributed on the polar out side. There will be a greater single point concentration in the solution where the micelles exist of both the orange oil and the alcohol. When ignition is achieved, a cell of the alcohol will ignite on the micelle, which will lead to ignition of the orange oil.

9. In sum, I do not believe that it would have been obvious to someone skilled in the art to combine the Wilkins patent with the Wesley patent to create the composition reflected in the Stephanos application

Executed this 30<sup>th</sup> day of July, 2003 at Golden, Colorado

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. I understand that willful false statements and the like are punishable by fine or imprisonment or both, and may jeopardize the validity of the application or any patent issuing thereon.

Ross Gustafson

Ross Gustafson

# Exhibit A

Ross M. Gustafson, M.S.  
401 Somerset Drive  
Golden, CO 80401  
(303)278-4772

## EDUCATION

- University of Colorado-Boulder  
Graduate Student: Fall 1984-Summer 1988  
M.S. Chemistry August 1988
- Gustavus Adolphus College  
B.A. Chemistry (ACS) May 1984

## ACADEMIC AND RESEARCH POSITIONS

- Research Assistant - University of Colorado - Boulder  
Summer 1985 - December 1987  
-Determination of enthalpy changes and electron transfer rates for a series of substituted metallocenes.
- Teaching Assistant - University of Colorado -Boulder  
Fall 1984 - Fall 1985
- Teaching Assistant - Gustavus Adolphus College  
Fall 1981 - Spring 1984
- Research Assistant - Gustavus Adolphus College  
Spring 1984  
-Development of an electroanalytical technique for quantitative analysis of tetrazoliums.

## WORK EXPERIENCE

- Florida Chemical Company, Inc. - March 1997 - August 2003
  - Technical Director
  - Assist customers in proper use and formulation of citrus by-products, including d-limonene and citrus peel oils.
  - Formulate new cleaning products.
  - Develop new uses for citrus oils in various fields, including applications in the oil and gas drilling industry, paving industry, heat transfer applications, and food products industry

- Attend trade shows with a show booth and sales personnel to answer questions regarding products and help customers with technical issues.
- Answer technical inquiries via phone, letters and e-mail.
- Put together technical bulletins regarding products.
- Assist sales force on calls to answer technical questions.
- Create MSDS's for new products and keep MSDS data updated.
- Keep in contact with government agencies to assure compliance current regulations and monitor for changes.
- Develop procedures and oversee QA and QC functions.
- Write papers and present presentations at technical conferences and customer sites.
- Develop solvent blends for use in cost reduction measures.

- BioChem Systems, Inc. - December 1995 - March 1996

- Golden Technologies Company - BioChem Systems Division  
June 1989 - December 1995

- Develop products for use as CFC substitutes in degreasing operations.
- Develop mixing and blending procedures for new products.
- Oversee initial production runs of new products.
- Control Quality Control functions by monitoring all in-coming raw materials.
- Control Quality Assurance by monitoring all out-going products.
- Create Quality Control and Quality Assurance procedures.
- Evaluate and compare competitive materials.
- Work with Customer Service to answer customer questions and solve problems that arise in the field.
- Train new distributors and employees on the proper use of the products.
- Develop methods for proper use and disposal of the products.
- Assist customers in adapting their operations to our products.

- Adolph Coors Company - Corporate Research and Development  
November 1987 - June 1989

- Research and development of a method for chemical vapor deposition of diamond and diamond-like thin films.
- Development of a near infrared spectrophotometric method for use in on-line determination of beer constituents and brand.
- Evaluation of on-line electrochemical oxygen sensors.
- Determination of causes and solutions to a problem of package corrosion.
- Assessments, both economic and technical, of emerging technologies and their effects on Coors industries.

-Use of on-line data bases to find literature information pertaining to on-going projects within the group.

## PUBLICATIONS AND PAPERS

- "The Use of Internal Standards for the Measurement of Reaction Entropies"; Koval, C.A., Gustafson, R.M., Reidsma, C.M.; *Inorganic Chemistry*, 26, 95, p.952 (1987).
- "Determination of Half-Reaction Entropy Change and Electrochemical Rate Constant for a Series of Substituted Metallocenes"; Gustafson, R.M.; Masters Thesis; University of Colorado, Boulder (1988).
- "Use of Near-Infrared Spectroscopy for On-line Analysis of Beer to Monitor the Packaging Process"; Gustafson, R.M.; Rocky Mountain Conference on Analytical Chemistry (1989).
- "Terpenes as Hazardous Solvent Replacements", Gustafson, R.M.; Center for Emissions Reduction Work Shop- Cleveland (1993).
- "Cleaning Options Using Terpene Solutions", Gustafson, R.M.; Precision Cleaning Conference- Chicago (1994).
- "One Fruity Formula", Gustafson, R.M.; *Parts Cleaning*, March, 1998.
- "d-Limonene: A Useful Aerosol Solvent", Gustafson, R.M.; *Spray Technology & Marketing*, January, 2001.
- "d-Limonene: A Safe and Versatile Naturally Occurring Alternative Solvent", Gustafson, R.M.; *Handbook for Critical Cleaning*, Chapter 1.12, Barbara Kanegsberg, editor; CRC Press, New York 2001.





- ✦ product scenting

### ***Flavor Applications for Orange Oil***

Very small amounts of cold pressed orange oil and folded orange oil may be used in certain food products:

- ✦ reconstituted orange juice
- ✦ non-juice beverages
- ✦ cookies & pastries
- ✦ candies
- ✦ extract for baking
- ✦ marinades

**Orange Oil MSDS**

**Folded Orange Oil MSDS**

## **Florida Chemical Company, Inc.**

351 Winter Haven Blvd, N.E. ✦ Winter Haven, FL 33881-9432 USA

Tel: (863) 294-8483 ✦ Fax: (863) 294-7783

email: [laurie@floridachemical.com](mailto:laurie@floridachemical.com)

**Cold Pressed Orange Oil**Data Sheet - Safety  
Sheet**Florida Chemical Company, Inc.**

351 Winter Haven Blvd, N.E. • Winter Haven, FL 33881-9432 USA

Tel: (863) 294-8483 • Fax: (863) 294-7783

email: laurie@floridachemical.com

**Product Data Sheet**

Preparation Date: July 2001

**DESCRIPTION**

Cold Pressed Orange Oil from Florida Chemical Co., Inc. is the cold pressed volatile oil obtained by expression from peel of the ripe citrus fruit. Florida Chemical Co., Inc.'s Midseason Cold Pressed Orange Oil comes from pineapple and seedling varieties of citrus. Valencia Cold Pressed Orange Oil from Florida Chemical Co., Inc. is restricted to the late season Valencia fruit.

**APPEARANCE & ODOR**

Bright and clear yellow to orange liquid. Midseason tending to have slightly darker color. Characteristic odor of the outer part of the fresh, sweet orange peel.

**TYPICAL ANALYSIS**

|                            |                         |
|----------------------------|-------------------------|
| Appearance                 | Light yellow-orange oil |
| Odor                       | Fresh orange aroma      |
| Specific Gravity (25°C)    | 0.842 - 0.846           |
| Refractive Index (20°C)    | 1.4720-1.4740           |
| Optical Rotation (25°C)    | +94° - +99°             |
| Aldehyde, % (as decyl)     | 1.2 - 2.5               |
| Flashpoint (cc)            | 118°F                   |
| Boiling Point              | 349°F                   |
| Evaporation Rate           | Slow                    |
| Water Solubility           | Insoluble               |
| Vapor Density (air=1)      | Over 1                  |
| Vapor Pressure (20°C)      | 2mmHg                   |
| Percent Volatile by Volume | 98%                     |

**Solubility**

|                 |           |
|-----------------|-----------|
| Benzyl Benzoate | Soluble   |
| Glycerine       | Insoluble |

|                  |                  |
|------------------|------------------|
| Mineral Oil      | Soluble          |
| Propylene Glycol | Slightly Soluble |

## USES & APPLICATIONS

Current d-Limonene formulators may find that Cold Pressed Orange Oil from Florida Chemical Co., Inc. is an effective and economic way to add color and extra citrus aroma to their product. Florida Chemical's Cold Pressed Orange Oil is a food product with a long history of uses in the flavor and fragrance industry. Examples include its use as an ingredient in fruit flavors and floral perfume compositions. Cold Pressed Orange Oil from Florida Chemical Co., Inc. is a common additive to many products requiring citrus flavor because of the sweet and fresh notes of the product.

## PACKAGING

Florida Chemical Co., Inc.'s Cold Pressed Orange Oil is packaged in epoxy-lined containers as follows:

|                |                       |                   |
|----------------|-----------------------|-------------------|
| 1-Gallon Pail  | 7 Pounds Net Weight   | 3.2 kg Net Weight |
| 5-Gallon Pail  | 35 Pounds Net Weight  | 16 kg Net Weight  |
| 55-Gallon Pail | 390 Pounds Net Weight | 177 kg Net Weight |

## STORAGE & HANDLING

Filled drums should be stored in well ventilated, covered areas at temperatures which should not exceed 70°F (21°C) for extended periods of time. Air should be excluded from partially filled drums by displacement with Nitrogen or CO<sub>2</sub>. Citrus oils are subject to oxidation. This process may be inhibited by the addition of antioxidants. Florida Chemical Co., Inc.'s Cold Pressed Orange Oil is "winterized" when it is first produced by storing it at freezing temperatures to remove the majority of natural waxes. Although this process is done as thoroughly as possible, trace amounts of waxy solids may remain and settle out of the product when stored for an extended amount of time, particularly in cold temperatures.

**Samples and certificates of analysis are available upon request.**

The information contained in these formulations is based on data obtained by Florida Chemical Co., Inc. and is considered accurate. No warranty is express or implied regarding the accuracy of these data, the results to be obtained from the use thereof, or that any such use will not infringe any patent. This information is furnished upon the condition the person receiving it shall determine the suitability for the particular purpose.

## Cold Pressed Orange Oil

Data Sheet      Safety  
Sheet

**Florida Chemical Company, Inc.**

351 Winter Haven Blvd, N.E. • Winter Haven, FL 33881-9432 USA  
 Tel: (863) 294-8483 • Fax: (863) 294-7783  
 email: laurie@floridachemical.com

## Material Safety Data Sheet

Preparation Date: July 2001

### Emergency Phone Numbers:

Florida Chemical: (863) 294-8483  
 CHEMTREC 24 Hour Number (800) 424-9300  
 In Canada, CANUTEC (613) 996-6666

## Section I - IDENTIFICATION

**Trade Name:** Cold Pressed Orange Oil - Midseason & Valencia  
**CAS Number:** 8028-48-6

## Section II - HAZARDOUS COMPONENTS

**Volatile Ingredients:** D-Limonene is the major component (90%) of Midseason and Valencia Orange Oil. These products are a by-product of citrus and entirely of natural origin.

### Hazardous Materials Identification System - HMIS:

|   |  |
|---|--|
| 1 | Health Hazard - Mild skin irritant               |
| 2 | Flammability - Flashpoint above 100°F            |
| 0 | Reactivity - Stable                              |
| B | Protection - Safety glasses & gloves recommended |

## Section III - PHYSICAL DATA

|                            |                         |
|----------------------------|-------------------------|
| Appearance                 | Light yellow-orange oil |
| Odor                       | Fresh orange aroma      |
| Specific Gravity (25°C)    | 0.842 - 0.846           |
| Refractive Index (20°C)    | 1.4720-1.4740           |
| Optical Rotation (25°C)    | +94° - +99°             |
| Aldehyde, % (as decyl)     | 1.2 - 2.5               |
| Flashpoint (cc)            | 118°F                   |
| Boiling Point              | 349°F                   |
| Evaporation Rate           | Slow                    |
| Water Solubility           | Soluble                 |
| Vapor Density (air=1)      | Over                    |
| Vapor Pressure (20°C)      | 2mmHg                   |
| Percent Volatile by Volume | 98%                     |

**Section IV - FIRE AND EXPLOSION HAZARD DATA**

**Flash Point (cc):** 118°F

**Flammable Limits:** LEL = Not Available UEL = Not Available

**Extinguishing Media:** Carbon dioxide, foam or dry chemical

**Special Fire Fighting Procedures:** SCBA recommended. Smother to exclude air. Do not use water. Handle as an oil fire.

**Unusual Fire and Explosive Hazards:** Combustible liquid. Keep away from heat, sparks, and open flame.

**Incompatibility (Materials to avoid):** Strong oxidizing agents.

**Hazardous Decomposition Products:** Not Available

**Hazardous Polymerization:** Will not occur

**Conditions to Avoid for Polymerization:** Not Available

**Stability Considerations:** Stable

**Conditions to Avoid for Stability:** Avoid temperatures over 118°F

**Section V - HEALTH HAZARD DATA**

**Health Hazards (Acute and Chronic):** Product is a moderate irritant, slight allergen, moderate ingestion and slight inhalation hazard under acute local application. Slight allergen under chronic local application.

**This Product Contains Carcinogens (NTP, IARC or OSHA):** NO

**Signs and Symptoms of Exposure:** Product may be irritating to the skin, eyes, nose and throat.

**Medical Conditions Generally Aggravated by Exposure:** Persons with allergies or pre-existing skin conditions should avoid contact with this product.

**Emergency & First Aid Procedures**

**Eyes:** Remove contact lenses at once. Flush with water for at least 15 minutes. If irritation persists, seek medical attention.

**Skin:** Wash affected area with copious amounts of soap and water. If irritation develops, seek medical attention.

**Ingestion:** Seek medical attention immediately. Do not leave victim unattended.

**Inhalation:** If symptoms of overexposure are experienced, evacuate to fresh air. If symptoms persist, seek medical attention.

**Section VI - SPILL OR LEAK PROCEDURES**

**Steps to be Taken if Material is Released or Spilled:** Use protective gloves to avoid skin contact. Small spills can be wiped up. Large spills should be absorbed by dirt, sand, or other suitable absorbents for disposal. Do not hose spills down drains, sewers, or waterways. Cold Pressed Orange Oil may be toxic to aquatic organisms. Move leaking containers to well ventilated area. No smoking. Eliminate any source of ignition. Minimize inhalation. Use NIOSH approved respiratory protection device. CAUTION: slippery on floor.

**Waste Disposal Method:** Incinerate or Dispose in Accordance with Local, State

**Section VII - SPECIAL PROTECTION INFORMATION**

**Respiratory Protection:** Not normally required. If vapor concentration becomes high, use NIOSH approved respirators

**Ventilation:** Local exhaust should be adequate. Mechanical ventilation otherwise recommended if necessary.

**Skin Protection:** Oil resistant gloves.

**Eye Protection:** Oil resistant goggles.

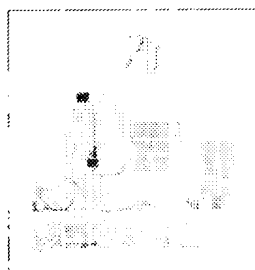
**Other Protective Equipment:** Oil resistant apron, emergency eye wash and shower stations.

**Appropriate Hygienic Practices:** Wash thoroughly after handling. Launder contaminated clothing before re-use.

### Section VIII - SPECIAL PRECAUTIONS

**Precautions to be Taken in Handling and Storing:** Usual precautions for combustible liquids.

**Handling and Storage Precautions:** Store in sprinklered warehouse. Avoid contact with incompatible chemicals listed in Section IV. Store in tightly sealed, full containers at temperatures below 70°F (21° C). Partially filled containers should be blanketed with nitrogen.




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## Florida Chemical Company, Inc.

351 Winter Haven Blvd. N.E. • Winter Haven, FL 33881-9432 USA

Tel: (863) 294-8483 • Fax: (863) 294-7783

*d-Limonene: The Safe Citrus Solvent from Florida Chemical Co.***d-Limonene**Data Sheet - Safety  
SheetTranslate this page automatically. **Florida Chemical Company, Inc.**

351 Winter Haven Blvd, N.E. • Winter Haven, FL 33881-9432 USA

Tel: (863) 294-8483 • Fax: (863) 294-7783

email: [laurie@floridachemical.com](mailto:laurie@floridachemical.com)**Product Data Sheet**

Preparation Date: August 15, 2001

**DESCRIPTION**

D-Limonene from Florida Chemical Co., Inc. is a biodegradable solvent occurring in nature as the main component of citrus peel oil. D-Limonene's interesting chemical properties, pleasant citrus aroma, & FDA-GRAS rating ("generally recognized as safe") have earned the product phenomenal acceptance in many diverse chemical applications. D-Limonene from Florida Chemical Co., Inc. can be used in its pure form, blended with most other solvents & drying oils, or easily emulsified to make water soluble cleaning products.

**APPEARANCE & ODOR**

Clear water-white to slightly yellow liquid with a mild to strong citrus aroma depending on grade.

**USES & APPLICATIONS**

d-Limonene from Florida Chemical Co., Inc. can be used as a replacement for toxic chlorinated solvents, glycol ether, MEK (methyl ethyl ketone), xylene, Freon, and CFC's, parts cleaner, engine degreaser (automotive, aircraft, and aerospace industries), electronics cleaning, tar and asphalt remover, asbestos shingle remover, graffiti remover, grease trap maintainer, lift station and sewage treatment applications, hand cleaner, floor cleaner, printing press cleaner, carpet stain cleaner, metal cleaner, aerosol ingredient, fragrance additive, odorant for petroleum industry, heat transfer medium, and possible candidate for a variety of medical applications including cancer and AIDS research.

**PACKAGING**

HOWS

|               |                      |                    |
|---------------|----------------------|--------------------|
| 1-Gallon Pail | 7 Pounds Net Weight  | 3.2 kg. Net Weight |
| 5-Gallon Pail | 35 Pounds Net Weight | 16 kg. Net Weight  |

55-Gallon Pail | 390 Pounds Net Weight | 177 kg. Net Weight

Florida Chemical Co., Inc.'s drums are typically orange or black DOT approved steel drums coated with an epoxy-phenolic resin liner. All drums of our domestic d-Limonene are filled to a net weight of 390 lbs. Dimensions of 55-gallon drums are: length 23", width 23", and depth 35". Imported drums of Brazilian d-Limonene are slightly smaller and typically filled to net weight of 375 lbs. Tank truck shipments average 6500 gallons (45,000 lbs). Overseas ISO tank shipments are either 20,000 liters (16,800 kg) or 24,000 liters (120,000 kg). Sample quantities (gallons & pints) are packaged in flourinated plastic containers or glass (1 oz. samples).

### STORAGE & HANDLING

Filled drums should be stored in well ventilated, covered areas at temperatures which should not exceed 70° F (21° C) for extended periods of time. Air should be excluded from partially filled drums by displacement with Nitrogen or CO<sub>2</sub>. Citrus oils are subject to oxidation. This process may be inhibited by the addition of antioxidants. d-Limonene samples and certificates of analysis from Florida Chemical Co., Inc. are available upon request.

**Caution: The user should conduct his/her own experiments and establish proper procedures and controls before attempting use of Florida Chemical Co., Inc.'s d-Limonene on critical parts.**

## d-Limonene

Data Sheet - Safety Sheet

### Florida Chemical Company, Inc.

351 Winter Haven Blvd, N.E. • Winter Haven, FL 33881-9432 USA

Tel: (863) 294-8483 • Fax: (863) 294-7783

email: laurie@floridachemical.com

### Material Safety Data Sheet

Preparation Date: August 15, 2001

### Emergency Phone Numbers:

Florida Chemical: (863) 294-8483

CHEMTREC 24 Hour Number (800) 424-9300

In Canada, CANUTEC (613) 996-6666

### Section I - IDENTIFICATION

**Trade Name:** D-Limonene - Technical grade. Orange Terpenes. Food grade.

**CAS Number:** 68647-72-3 - Orange Terpenes

**CAS Number:** 94266-21-4 - Food grade

**CAS Number:** 68647-72-3 - Orange Terpenes

### Section II - HAZARDOUS COMPONENTS



**Volatile Ingredients:** D-Limonene (solvent) is the major component (technical grade 95%, food grade 96%, lemon-lime 70%) with balance other terpene hydrocarbons and oxygenated compounds - octanal, nonanal, decanal, linalool predominant. Product is a by-product of citrus, entirely of natural origin, and to the best of our knowledge and belief contains no artificial flavors, sulfites, nitrites, or pesticide residue exceeding tolerances established by the FDA. Florida Chemical Co., Inc.'s d-Limonene does NOT contain lead, cadmium, mercury, or hexavalent chromium or come in contact with these chemicals since it is a citrus derived essential oil produced by steam distillation. Further, Florida Chemical Co., Inc.'s d-Limonene is packaged in food grade containers with inert liners that do NOT contain lead, cadmium, mercury, or hexavalent chromium. Florida Chemical Co., Inc.'s d-Limonene does NOT contain and is NOT manufactured with any of the Class I or II ozone-depleting substances listed under the United States Clean Air Act of 1990.

### Hazardous Materials Identification System - HMIS:

|   |  |
|---|--|
| 1 | Health Hazard - Mild skin irritant               |
| 2 | Flammability - Flashpoint above 100° F (38° C)   |
| 0 | Reactivity - Stable                              |
| G | Protection - Safety glasses & gloves recommended |

### Section III - PHYSICAL DATA

|                            | Technical Grade           | Food Grade        | Lemon-Lime Grade      |
|----------------------------|---------------------------|-------------------|-----------------------|
| Appearance                 | Yellow to water-white oil | Water-white oil   | Water-white oil       |
| Odor                       | Strong orange aroma       | Mild orange aroma | Mild lemon-lime aroma |
| Specific Gravity (25°C)    | 0.838 - 0.843             | 0.838 - 0.843     | 0.841 - 0.848         |
| Refractive Index (20°C)    | 1.4710 - 1.4740           | 1.4710 - 1.4740   | 1.470 - 1.4770        |
| Optical Rotation (25°C)    | +96° - +104°              | +96° - +104°      | +70° - +75°           |
| Flashpoint (cc)            | 115° F (46°C)             | 113° F (45°C)     | 119° F (48°C)         |
| Boiling Point              | 175.5° - 176° C           | 175.5° - 176° C   | 325° F                |
| Evaporation Rate           | Medium/Fast               | Medium/Fast       | Medium/Fast           |
| Water Solubility           | Insoluble                 | Insoluble         | Insoluble             |
| Vapor Pressure (20°C)      | 2mmHg                     | 2mmHg             | 2mmHg                 |
| Percent Volatile by Volume | 95+%                      | 95+%              | 95+%                  |

### Section IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point (cc):** 115°F (46°C), 113°F (45°C), 119°F (48°C) (Technical grade, Food grade, Lemon-Lime grade respectively)

**Flammable Limits:** LFL = 0.7% UEL = 6.1% (Identified for Technical grade only)

**Extinguishing Media:**

**Special Fire Fighting Procedures:**

Do not use water. Handle as an oil fire.

**Unusual Fire and Explosive Hazards:** Combustible liquid. Keep away from heat, sparks, and open flame. Guard against spontaneous combustion of improperly discarded oily rags.

**Incompatibility (Materials to avoid):** Strong oxidizing agents and acid chlorides.

including acidic clays, peroxides, halogens, vinyl chloride, and iodine pentafluoride.

**Hazardous Decomposition Materials:** Smoke may be acrid and fume irritating. Burning generates CO, CO<sub>2</sub>, and smoke.

**Hazardous Polymerization:** None described

**Conditions to Avoid for Polymerization:** Polymerization catalysts such as aluminum chloride and acidic clays.

**Stability Considerations:** Stable

**Conditions to Avoid for Stability:** Avoid temperatures over 115° F (46°C)

### Section V - HEALTH HAZARD DATA

**Health Hazards (Acute and Chronic):** Product is harmful if swallowed. Ingestion may cause vomiting, headache, and other medical problems. May be irritating to skin and eyes. Skin contact may cause slight redness. Contains a potential skin sensitizer. Eye contact can cause moderate to high irritation. Inhalation can cause nose, throat, and respiratory tract irritation, coughing and headache. Prolonged or repeated exposure can cause drying, defatting, and dermatitis of skin.

**Signs and Symptoms of Exposure:** Product may be irritating to the skin, eyes, nose and throat.

**Medical Conditions Generally Aggravated by Exposure:** Persons with allergies or pre-existing skin conditions should avoid contact with this product.

**Emergency & First Aid Procedures Eyes:** Remove contact lenses at once. Flush with water for at least 15 minutes. If irritation persists, seek medical attention.

**Skin:** Wash affected area with copious amounts of soap and water. If irritation develops, seek medical attention.

**Ingestion:** Seek medical attention immediately. Do not induce vomiting. Rinse mouth with water, then drink one glass of water. Do not leave victim unattended. Never give anything by mouth if victim is unconscious, is rapidly losing consciousness, or is convulsing.

**Inhalation:** If symptoms of overexposure are experienced, evacuate to fresh air. If symptoms persist, seek medical attention.

### Section VI - TOXICOLOGY DATA

**Acute Eye Irritation:** Eye irritation, rabbit. Severely irritating.

**Acute Skin Irritation:** Skin irritation, rabbit. Severely irritating.

**Acute Dermal Toxicity:** LD50 - >5 g/kg, rabbit.

**Acute Respiratory Irritation:** No test data found for product.

**Acute Inhalation Toxicity:** No test data found for product.

**Acute Oral Toxicity:** LD50 - >5 g/kg, rat.

**Chronic Toxicity:** This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or "suspected" human carcinogens.

**Ecotoxicological Information:** Product may be toxic to aquatic organisms

### Section VII - SPILL OR LEAK PROCEDURES

**Steps to be Taken if Material is Released or Spilled:** Use protective gloves to avoid skin contact. Small spills can be wiped up. Large spills should be absorbed by dirt, sand, or other suitable absorbents for disposal. Do not hose spills down drains, sewers, or waterways. D-Limonene may be toxic to aquatic organisms.

Move leaking containers to well ventilated area. No smoking. Eliminate any source of ignition. Minimize inhalation. Use NIOSH approved respiratory protection device in areas of high vapor concentration. CAUTION: slippery on floor

**Waste Disposal Method:** Incinerate or Dispose in Accordance with Local, State, and Federal Regulations. Taking regulations into consideration, waste may be incinerated or handled through EPA spill control plan via land fill or dilution.

### Section VIII - SPECIAL PROTECTION INFORMATION

**Respiratory Protection:** Not normally required. If vapor concentration becomes high, use NIOSH approved respirators.

**Ventilation:** Local exhaust should be adequate. Mechanical ventilation otherwise recommended if necessary.

**Skin Protection:** Oil resistant gloves.

**Eye Protection:** Safety goggles or glasses suggested.

**Other Protective Equipment:** Oil resistant apron, emergency eye wash and shower stations.

**Appropriate Hygienic Practices:** Wash thoroughly after handling. Launder contaminated clothing before re-use.

### Section IX - SPECIAL PRECAUTIONS

**Precautions to be Taken in Handling and Storing:** Usual precautions for combustible liquids.

**Handling and Storage Precautions:** Store in sprinklered warehouse. Avoid contact with incompatible chemicals listed in Section IV. Store in tightly sealed, full containers at temperatures below 70° F (21°C). Partially filled containers should be blanketed with nitrogen.

**Other Precautions:** Product may expand slightly in storage causing pressure to build in container. Open container carefully if product appears to be under pressure. Drum lining may occasionally chip and fall to bottom of container after long storage or excessive handling. As a precaution, pour liquid through filter/strainer to catch small pieces of liner before blending or repackaging. Commercially clean empty containers before re-use. CAUTION: Do not weld or cut empty containers (Vapors May Ignite).

### Section X - REGULATORY INFORMATION

| Inventory               | Status                   |
|-------------------------|--------------------------|
| United States (TSCA)    | Listed on the inventory. |
| Canada (DSL)            | Listed on the inventory. |
| European Union (FINECS) | Listed on the inventory. |
| Australia (AICS)        | Listed on the inventory. |
| Japan (MITI)            | Listed on the inventory. |
| South Korea (KECL)      | Listed on the inventory. |

### Section XI - TRANSPORTATION INFORMATION

All such statements or descriptions are informational only and are not made or given as a warranty of fitness for particular purpose. Buyer is solely responsible for determining the adequacy of each label, or package for the particular use or uses to which they are applied. Florida Chemical Co., Inc. does not assume buyer's responsibility for compliance with or any Federal, State or local laws, rules ordinances or regulations. The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

|                     |           |  |
|---------------------|-----------|--|
| <b>TDG Status:</b>  | Hazardous | DOT Label/Placard [exemption § 173.150(f) applies.     |
| <b>IMO Status:</b>  | Hazardous | Highway/Rail: per requirements for Combustible Liquids |
| <b>IATA Status:</b> | Hazardous | Air/Ship: per requirements for Flammable Liquids       |

**SHIPPING CLASSIFICATION:**

**Proper Shipping Name:** TERPENE HYDROCARBONS, N.O.S.  
**Hazard Class:** 3  
**Identification No.:** UN2319  
**Packing Group:** III

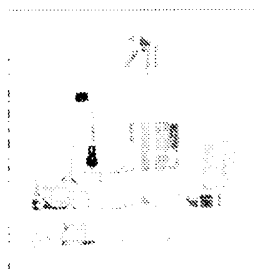
**Section XII - ADDITIONAL INFORMATION****National Fire Protection Association Hazard Ratings - NFPA(R):**

1 Health Hazard - Slight  
2 Flammability - Moderate  
0 Reactivity - Minimal

**Key Legend Information:**

ACGIH American Conference of Governmental Industrial Hygienists  
OSHA Occupational Safety and Health Administration  
NTP National Toxicology Program  
IARC International Agency for Research on Cancer

The information contained herein is based on data obtained by Florida Chemical Co., Inc. and is considered accurate. No warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or that any such use will not infringe any patent. This information is furnished upon the condition the person receiving it shall determine the suitability for the particular purpose.



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